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# FIRST RECORD OF *PARANTHIAS* CF. *FURCIFER* (ACTINOPTERYGII: PERCIFORMES: SERRANIDAE) FROM THE CENTRAL MEDITERRANEAN, WITH NOTES ON THE IDENTIFICATION OF MARINE SPECIES FROM IMAGERY

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**Abstract.** An individual fish, identified as a species of *Paranthias*, is recorded from a photograph taken in July 2013 at Marsascala, Malta. The species is likely to be *P. furcifer* but since no actual specimen has been forthcoming in spite of a long time since this record, and as certain identification is based on meristic counts, the fish is only conclusively identified to the genus level. Nonetheless, this is the first record of this genus from the central Mediterranean. The problems of identification based on images alone are discussed and it is recommended that publications based on such identifications should include a critical analysis of the uncertainties in the identification and of alternative identifications.

**Keywords:** alien species, Epinephelinae, Malta, non-indigenous species, Serranidae

## INTRODUCTION

Time lags in reporting new organism arrivals can create uncertainty in the analysis of introduction rates of alien species with ramifications for adequate prevention and management measures (Zenetos et al. 2019). Besides the often unquantifiable time lag between the true first occurrence of an alien species and its first record (Blackburn et al. 2011), there can also be a considerably long interval between the date of a finding and its publication (Smith et al. 2018). Images such as those taken by sea-users are undoubtedly very useful as first alerts to the occurrence of new species or to changes in distribution, and their rapid publication can help reduce reporting time lags. On the other hand, images may not clearly show key identification features, and their hasty publication may lead to misidentification if authors are not very careful (Evans and Schembri 2017a, 2017b). This is problematic since once a new record is published and the species is included in databases, it can be difficult to correct the error. Indeed, reliable identification of alien species is considered one of the top issues for the management of bioinvasions in Europe (Ojaveer et al. 2014a).

Groupers (Serranidae: Epinephelinae) are a good example of the potential difficulties with photo-identification, given the similarity in the color pattern of some species, and ontogenetic changes and other variations in livery (Heemstra and Randall 1993). In addition to the six species of Epinephelinae that occur natively in the Mediterranean (Heemstra and Randall 1993), 10 other species of groupers have been recorded as recent newcomers (i.e., alien or range-expanding species) in this sea. These are: *Cephalopholis nigri* (Günther, 1859), *Cephalopholis taeniops* (Valenciennes, 1828), *Epinephelus areolatus* (Forsskål, 1775), *Epinephelus coioides* (Hamilton, 1822), *Epinephelus fasciatus* (Forsskål, 1775), *Epinephelus geoffroyi* (Kluzinger, 1870)**, *Epinephelus malabaricus* (Bloch et Schneider, 1804), *Epinephelus merra* Bloch, 1793, *Mycteroperca fusca* (Lowe, 1838), and *Paranthias furcifer* (Valenciennes, 1828) (see Vella et al. 2016, Golani et al. 2017 and references therein).

The creole-fishes *Paranthias* spp. differ from the majority of other groupers in having a comparatively small mouth, numerous elongated gill-rakers, and a deeply forked caudal fin, which represent adaptations for a zooplanktivorous diet. Apart from the lyretails *Variola* spp., which have lunate tails, all other groupers possess a rounded, truncate or concave caudal fin. *Paranthias* spp. can be told apart from *Variola* spp. by the former's smaller head length (relative to body length), differently shaped dorsal and anal fins, and completely different color pattern (Heemstra and Randall 1993). Some species of *Pseudanthias* (Serranidae: Anthiinae) have similar body morphology to *Paranthias* spp., but differ in terms of fin counts and none of them share exactly the same coloration.

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** According to Randall et al. (2013) and Golani et al. (2015).

Thus *Paranthias* spp. are readily distinguishable from all other closely-related genera, even from images alone. In contrast, the two species belonging to this genus, *Paranthias colonus* (Valenciennes, 1846) and *P. furcifer*, have practically identical shapes and color patterns, and can only be identified to species level based on meristic counts of the dorsal and anal fin rays (Heemstra and Randall 1993).

## RESULTS AND DISCUSSION

In July 2013, we received a report accompanied by a photograph of an unusual fish observed while SCUBA diving at Marsascala, Malta (Fig. 1). This fish was seen swimming over a rocky bottom close to the shore, at a depth of 3–5 m. The fusiform shape of the body, deeply forked tail, coloration consisting of a reddish body becoming paler ventrally, three widely spaced whitish spots between the dorsal-fin base and lateral line and another two on the mid-lateral part of the caudal peduncle, allowed positive identification of *Paranthias* spp. (Heemstra and Randall 1993, Froese and Pauly 2019). The specimen from Malta has a clear orange-red spot at the upper end of the pectoral-fin base. Identification guides list this character for *P. furcifer*, whereas *P. colonus* is described as having a bright blue spot on the pectoral fin axil (Heemstra and Randall 1993, Froese and Pauly 2019). Nonetheless, some images of *P. colonus* from its native range available through FishBase (Froese and Pauly 2019) show a bright red spot on its pectoral fin base; thus, this character is not reliable for distinguishing between the two species.

Given the uncertainty regarding the identity of this species, we opted to refrain from immediately publishing the record but instead to wait in case a specimen could be collected, enabling us to undertake a detailed morphological examination. Since, as far as we are aware, no other individuals of this species have been reported from Malta to date, we are publishing the initial record so that it can be incorporated in regional databases for use in the analyses of distribution and establishment patterns. Although the identity of the fish cannot be conclusively determined from the photograph, neither species of *Paranthias* is imported for mariculture or through the aquarium trade, so the specimen very likely reached Malta through dispersal, most probably by actively following a slow-moving vessel such as one towing an oil platform, rather than through unaided natural dispersal. In this regard, it is much more plausible that the specimen was the Atlantic creole-fish *P. furcifer*, whose native range includes the western Atlantic plus Ascension Island and the Gulf of Guinea islands of Principe, São Tomé, and Annobon. In contrast, the Pacific creole-fish *P. colonus* is restricted to the eastern Pacific, and, while not impossible, its translocation to the Mediterranean seems less likely.

Furthermore, *P. furcifer* has already been conclusively recorded from the Mediterranean Sea. In particular, a specimen was caught in Croatia (Adriatic Sea) in 2011 (Dulčić and Dragičević 2013). The availability of an actual specimen enabled these authors to positively identify it based on meristic counts. The presence of the Atlantic creole-fish in the Adriatic was attributed to possible vagrancy or translocation associated with an oil platform (Dulčić and Dragičević 2013 ). Translocation facilitated by slow-moving vessels such as towed oil platforms is likely, given that *P. furcifer* is not oceanodromous and also considering that the fish was found relatively close to commercial harbors, shipyards, and an oil terminal (Dulčić and Dragičević 2013).

The second report of *P. furcifer* from the Mediterranean, based on a specimen caught off Lebanon in 2007, was published by Crocetta et al. (2015). However, this specimen was not preserved, and only a relatively low-resolution photograph appears to be available (fig. 16D in Crocetta et al. 2015). Although these authors claim that the image leaves no doubt as to the identity of the species, in our opinion it could equally represent a specimen of *P. colonus*, and no justification for ascribing it to *P. furcifer* was provided. Nonetheless, the arguments made above with regards to the identity of

**Fig. 1.** Photograph of *Paranthias* sp., probably *P. furcifer* (see main text), taken in July 2013 and representing the first record of this species from the central Mediterranean. Photograph courtesy of Erica Scerri

the specimen sighted in Malta also apply to that reported by Crocetta et al. (2015), so the most plausible scenario is that the Lebanese record was indeed *P. furcifer*. It is important for authors to exercise caution when making identifications from photographs, highlighting and discussing any doubts in the identification, rather than dismissing these or simply ignoring them. There are several examples where a non-critical examination of images led to erroneous identifications (see Evans et al. 2017a, 2017b, for discussion of two cases from the central Mediterranean).

Zenetos et al. (2019) have cited the record of *P. furcifer* by Crocetta et al. (2015) as an example for how time lags in reporting can lead to potential misinterpretations since it was previously thought that *P. furcifer* was first introduced in the Mediterranean in 2011 (Dulčić and Dragičević 2013) given that the record made in 2007 remained unpublished until 2015. Our approach to delay publication of the finding from Malta in 2013 has contributed to having an incomplete picture of the status of this species in the Mediterranean. On the other hand, the record from Lebanon and the present one from Maltese waters highlight the trade-off that conscientious authors need to make between publishing any records in a timely manner, and at the same time ensuring correct identification, particularly when identifications are based solely on images. In this regard, we recommend that when there are potential doubts with regards to species identification, every effort should be made at trying to obtain a specimen prior to publication of the record and adhering to the best practices proposed by Bello et al. (2014). On the other hand, in the context of an early warning and rapid response framework (Ojaveer et al. 2014b), authors should avoid overly delaying publications especially if the species represents a definite new record for a particular region. Either way, if no actual specimens are obtained, it is imperative that authors critically examine their images and discuss uncertainties and alternative identifications.

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